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Remarks by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

In the second term of the second member of the equation, $\frac{1}{2}(p-4)$ should be $\frac{1}{2}(p-3)$. The equation is generally but not universally true as is shown by induction in what follows.

Let $p=4m+3$, then $\frac{1}{2}(p-1)=2m+1$, $\frac{1}{2}(p-3)=m$,

$$\sum_{n=1}^{\frac{1}{2}(p-1)} \left[\frac{n^2}{p} \right] = \frac{p-3}{4} \cdot \frac{p-1}{2} - \sum_{n=1}^{\frac{1}{4}(p-3)} [\sqrt{(np)}],$$

or as follows:

$$\begin{array}{rcl} A & = & B - C, \\ m=2, & 3 & = 10 - 7, \\ m=3, & 7 & = 21 - 14, \\ m=4, & 11 & = 36 - 25, \\ m=5, & 18 & = 55 - 37, \\ m=7, & 34 & = 105 - 71. \end{array}$$

If one of the $[n^2/p]$ is an exact quotient, and hence one of the $[\sqrt{(np)}]$ rational, the equation is $A=1+B-C$.

$$\begin{array}{l} m=6, \quad p=27, \quad [9^2/p]=3, \quad \sqrt{(3 \times 27)}=9, \\ m=15, \quad p=63, \quad 21^2/p=7, \quad \sqrt{(7 \times 63)}=21. \end{array}$$

$$\therefore A=1+B-C, \quad m=6 \dots 25=1+78-54, \quad m=15 \dots 153=1+465-313.$$

If two of the $[n^2/p]$ are exact quotients, and hence two of the $[\sqrt{(np)}]$ rational, the equation becomes $A=2+B-C$.

$$m=18, \quad p=75, \quad 15^2/p=3, \quad \sqrt{(3 \times p)}=15, \quad 30^2/p=12, \quad \sqrt{(12 \times p)}=30.$$

$\therefore A=2+B-C$ becomes $219=2+666-449$ for $m=18$. $A=t+B-C$ is the true universal equation.

The geometric proof in this solution is wanting. Who can produce it? Ed. F.

155. Proposed by PROF. R. D. CARMICHAEL, Anniston, Alabama.

If p and q are primes and m and n are any integers, find the cases in which the equation $p^m - q^n = 1$ may be satisfied.

Remarks by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

Some values, found by inspection, are given in the following table:

p	q	m	n
3	2	1	1
3	2	2	3
2	1	1	1
2	31	5	1
2	127	7	1

ERRATUM. In 156 for e^2 read e^3 .

AVERAGE AND PROBABILITY.

196. Proposed by R. D. CARMICHAEL, Anniston, Ala.

A circle is inscribed in a square. Find the chance that the distance between two points within the square and without the circle shall not exceed a side of the square.

Solution by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

Let $2a$ = side of square; (x, y) , (u, v) the coordinates of the points; $\sqrt{(a^2 - x^2)} = y_1$, $\sqrt{(a^2 - u^2)} = v_1$. If both points are in the same corner, the distance between them is always less than $2a$. If both points are situated one each in opposite corners, the distance between them is always greater than $2a$. If both points are placed one each in adjacent corners, we have $\sqrt{[(x-u)^2 + (y+v)^2]} = 4a^2$, for the greatest distance between the points and $\sqrt{\{(x-u)^2 + [\sqrt{(a^2 - x^2)} + \sqrt{(a^2 - u^2)}]^2\}} = \sqrt{[(x-u)^2 + (y+v)^2]}$, for the least distance between the points.

$$\therefore v_2 = \sqrt{[4a^2 - (x-u)^2]} - y, \quad v_3 = \sqrt{(a^2 - x^2)} + \sqrt{(a^2 - u^2)} - y.$$

$$\therefore p = \frac{\int_0^a \int_0^a \left[\int_{y_1}^a \int_{v_1}^a dy dv + \int_{y_1}^a \int_{v_1}^{v_2} dy dv \right] dx du + \int_0^a \int_0^x \int_{y_1}^a \int_{v_3}^{v_2} dx dy dv}{3 \int_0^a \int_0^a \int_{y_1}^a \int_{v_1}^a dx dy du dv}$$

$$= \frac{a^4(4-\pi)^2 + 0 + .16 \int_0^a \int_0^x \int_{y_1}^a \int_{v_3}^{v_2} dx dy dv}{3a^4(4-\pi)^2} = \frac{1.6}{3a^4(4-\pi)^2} M.$$

$$M = \int_0^a \int_0^x \int_{y_1}^a \{ \sqrt{[4a^2 - (x-u)^2]} - \sqrt{[a^2 - x^2]} - \sqrt{[a^2 - u^2]} \} dx dy du$$

$$= \int_0^a \int_0^x [a - \sqrt{(a^2 - x^2)}] \{ \sqrt{[4a^2 - (x-u)^2]} - \sqrt{[a^2 - x^2]} - \sqrt{[a^2 - u^2]} \} dx du$$